Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C.

In the Matter of The Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communication Requirements Through the Year 2010	WT Docket No. 96-86

COMMENTS OF M/A-COM, INC., ON THE SEVENTH NOTICE OF PROPOSED RULEMAKING

M/A-COM, Inc. ("M/A-COM"), urges the Commission to act decisively to address technical and operational matters for the 700 MHz frequencies in order to ensure timely access by public safety entities to much-needed frequencies.[1] *First*, M/A-COM believes that the Commission should adjust—along the lines of M/A-COM's previous proposals and the Nortel/EADS proposal[2]—the adjacent channel power ("ACP") requirements of Section 90.453(a) of the Commission's rules as they apply to 6.25 kHz, 12.5 kHz, and 25 kHz channels. The Commission's current requirements are unnecessarily strict and limit "main channel" modulation choices without providing any real additional interference protection to adjacent channel receivers. *Second*, M/A-COM believes that the Commission should reconsider its

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1 *See The Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010, Seventh Notice of Proposed Rulemaking*, 20 FCC Rcd. 831, 845-61 (2005) ("NPRM").

2 NPRM, 20 FCC Rcd. at 851 ¶ 46.

proposals for a 700 MHz wideband interoperability channel standard, as there is little demonstrated need for such wideband channels. To the contrary, the public safety community has expressed interest in converting these channels to general use channels. Should the Commission nevertheless find a need for such wideband interoperability channels and a corresponding standard, it should first seek further development of the standard to address the application layer. The Commission should also defer the requirement for the manufacture of radios capable of operating over all interoperability channels pending refinement of the standard.

M/A-COM is a leading technology developer and manufacturer of radiofrequency ("RF"), microwave, and millimeter wave semiconductors, components, and technologies serving the public safety and critical infrastructure, broadband, wireless data, aerospace, defense, and automotive market segments. M/A-COM has long been an industry leader in providing advanced two-way land mobile products and systems to the public safety, including its recent introduction of cutting edge 6.25 kHz equivalent efficiency public safety solutions, poised for deployment at 700 MHz. M/A-COM is also a pioneer in the development of Internet protocol ("IP")-based networks for private radio applications, and supplies industry-leading brands as EDACS®, OpenSky® and ProVoice™. M/A-COM is part of Tyco Electronics, one of the world's leading suppliers of electronic components.

I. THE COMMISSION SHOULD MODIFY THE ACP REQUIREMENTS FOR 6.25 KHZ, 12.5 KHZ, AND 25 KHZ CHANNELS IN ORDER TO AVOID CONSTRAINING "MAIN CHANNEL" MODULATION CHOICES WITHOUT PROVIDING ANY CORRESPONDING ADJACENT CHANNEL INTERFERENCE PROTECTION BENEFIT

The Commission should modify the ACP requirements for 6.25 kHz, 12.5 kHz, and 25 kHz channels in order to avoid constraining "main channel" modulation choices without

providing any corresponding adjacent channel interference protection benefit.[3] The Commission should base its modifications along the lines of M/A-COM's previous proposals and on the Nortel/EADS proposal.[4]

For practical purposes, the 12.5 kHz values proposed by Nortel/EADS and in the M/A-COM 6th NPRM Comments are essentially identical. Nortel and EADS have proposed to adjust the first offset value for 12.5 kHz channels from 9.375 kHz to 9.55 kHz.[5] Nortel and EADS have also proposed to adjust the measurement bandwidth for the first offset value from 6.25 kHz to 5.9 kHz.[6] As the Commission notes, Nortel/EADS also suggest similar adjustments for 6.25 kHz and 25 kHz transmitters, but propose no values.[7] M/A-COM therefore urges the Commission to adopt the adjustments detailed in M/A-COM's original proposals, as well as the Nortel/EADS proposal. By doing so, the Commission would permit the use of more spectrally efficient technologies without increasing adjacent channel interference potential.

As the spectral mask of certain modulations "falls off" into adjacent bands, the amount of power present in this portion of the signal could approach or exceed the ACP limit at the first frequency offset. Nevertheless, this "falling off" need not preclude modification of the ACP requirements because radios are normally designed with receive filters employing an effective

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3 *See* NPRM, 20 FCC Rcd. at 851 ¶¶ 46, 47. The third sentence of the Section 90.543(b) *ACP Measurement Procedure* text proposed in Appendix D of the NPRM reflects an editing error. M/A-COM believes that the existing fourth sentence of Section 90.543(b) states the Commission's intended TDMA transmitter ACP measurement procedures.

4 *See* Comments of M/A-COM Private Radio Systems, Inc., on the Sixth Further Notice of Proposed Rulemaking, WT Docket No. 96-86 (filed Dec. 9, 2002) ("M/A-COM 6th NPRM Comments"); NPRM, 20 FCC Rcd. at 851 ¶¶ 46, 47. The Commission has never addressed M/A-COM's proposals.

5 *Id*. at 851 ¶ 46.

6 *Id*.

7 *Id*.

bandwidth slightly less than the assigned channel width. For example, for a 6.25 kHz channel receiver, the effective filter bandwidth might be 5 kHz, and for a 12 kHz channel receiver the effective filter bandwidth might be 10 kHz. Consequently, the desired channel receiver filters out the adjacent band "falling-off" power, as described above.

Under the Commission's current Section 90.543(a) ACP requirements, however, modulations such as these would be precluded for failing to meet the first frequency offset ACP emission limit.[8] The current Section 90.543(a) requirements therefore constrain modulation design without necessarily providing additional adjacent channel interference protection.[9] This excessive protection also increases infrastructure costs for public safety entities.

M/A-COM estimates that adjusting the ACP requirements for 6.25 kHz transmitters—as M/A-COM, Nortel, and EADS have proposed—would result in 1 dB of additional link budget performance compared to the current ACP requirement. Though 1 dB seems small, in practical terms, it is sufficient to balance an inbound portable radio link/coverage to the outbound base station radio link/coverage. Similarly, an extra 1 dB of link budget performance on the outbound base station radio/link (assuming inbound and outbound links are balanced) increases the site coverage radius by about 7 percent and reduces the site density by about 15 percent. A typical relationship between site density and link budget is illustrated in Figure 1 below.

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8 47 C.F.R. § 90.543(a).

9 Here, M/A-COM addresses modulations with power levels that are right around the first frequency offset ACP emission limit. Obviously, if the modulation signal levels far exceeded any of the ACP limits, this analysis would change.

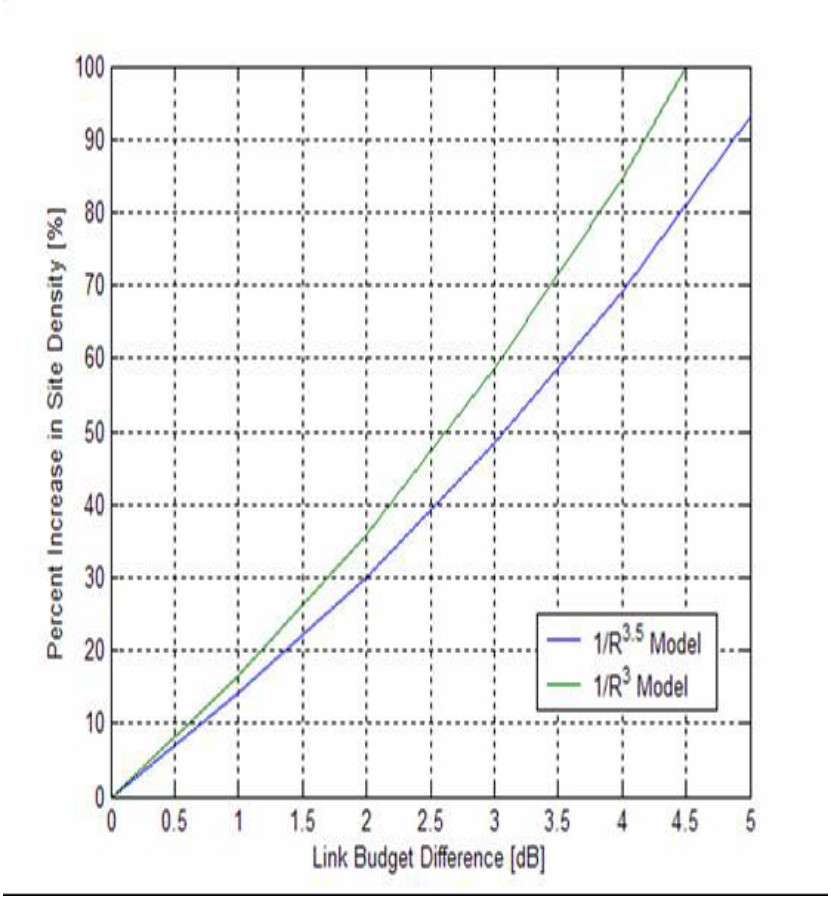

Figure 1:

Illustration of the Relationship Between Link Budget Differences and Site Density Differences

By increasing the coverage area for each transmitter, the extra 1 dB of link budget performance afforded by the M/A-COM and Nortel/EADS proposals would therefore help public safety entities in controlling infrastructure costs. Typically, the number of sites to provide radio coverage for a specified wide-area service application greatly affects total system cost. M/A-COM estimates that every 1 dB increase in link performance could reduce public safety entities' infrastructure costs by 15 percent. Conversely, by maintaining the current ACP requirements, the Commission could greatly increase public safety entities' infrastructure costs.

The extra 1 dB of link budget performance provided by the M/A-COM and Nortel/EADS proposals would also allow for more efficient equipment design. The current ACP requirements function as a design constraint, precluding use of alternative modulations without any corresponding adjacent channel interference protection benefit. To allow for more efficient equipment design—and to reduce infrastructure costs for public safety entities—the Commission should proceed to adopt the M/A-COM and Nortel/EADS proposals.

II. THE COMMISSION SHOULD RECONSIDER ITS PROPOSALS FOR A 700 MHZ WIDEBAND INTEROPERABILITY CHANNEL STANDARD

The Commission should reconsider its proposals for a 700 MHz wideband interoperability channel standard, known collectively as TIA-902 (SAM). To date, the public safety community has not identified any clear need for 700 MHz wideband interoperability channels, calling into question both the need for a mandatory standard for such channels or a requirement to manufacture radios capable of operating over all interoperability channels. Instead, the Commission should consider converting the currently designated 700 MHz wideband interoperability channels to general use channels. Should the Commission nevertheless find a need for such wideband interoperability channels and, consequently, the TIA-902 (SAM) standard, it should first seek further development of the standard to address the application layer. It should also defer the requirement for manufacture of radios capable of operating over all interoperability channels unless and until the standard is refined.

A. The Commission Should Consider Converting the Currently Designated 700 MHz Wideband Interoperability Channels to General Use Channels, Given that the Public Safety Community Has Not Identified Any Clear Need for Such Wideband Interoperability Channels

In the Public Safety National Coordination Committee ("NCC") process, the public safety community did not identify any clear need for 700 MHz wideband interoperability

channels. During that process, the public safety community identified a single data interoperability requirement, for short text messaging.[10] Yet short text messaging does not even require wideband data channels. M/A-COM therefore questions the need for a 700 MHz wideband interoperability channel standard[11] and the requirement to manufacture radios capable of operating over all interoperability channels.[12] Adoption of the standard would therefore only increase the cost of radios without providing any true interoperability benefit.

Notwithstanding a lack of immediate need for 700 MHz wideband interoperability channels, however, the public safety community has expressed interest in additional 700 MHz spectrum for general public safety use. Many public safety entities have expressed a desire for additional flexibility in using frequencies and also for more 700 MHz public safety spectrum beyond the 24 MHz the Commission has allotted, based on concerns that regional planning and interference concerns could result in immediate spectrum shortages.[13] The Commission should therefore consider converting the 700 MHz wideband interoperability channels into general use channels. By doing so, the Commission would increase the availability of wideband general use channels by 37.5 percent without affecting the current 700 MHz wideband channel reserve.

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[10] *See, e.g.*, Transcript of May 30, 2002, Meeting of the NCC Interoperability Committee Meeting Transcript, at 32-34, 38, *available at* http://wireless.fcc.gov/publicsafety/ncc/transcripts/05-30-2002-Interoperability-DC.pdf.

[11] *See* NPRM, 20 FCC Rcd. at 852 ¶ 50.

[12] *See id*. at 852-53 ¶ 51.

[13] *See, e.g.*, Comments of Commonwealth of Pennsylvania, Office of Public-Safety Radio Services, WT Docket No. 05-157, at 4-5 (filed Apr. 28, 2005); Comments of Westchester County, New York, WT Docket No. 05-157, at 3-4 (filed Apr. 28, 2005).

B. If the Commission Finds a Need for the TIA-902 (SAM) Standard, It Should Seek Further Development of that Standard to Address the Application Layer

Should the Commission conclude that there is a need for 700 MHz wideband interoperability channels and a mandatory standard, the Commission should first seek to standardize the application layer. The TIA-902 (SAM) standard does not go far enough to ensure true interoperability, as it does not currently address that layer.

For many technologies, standardization takes place at the lower levels of the protocol stack, *e.g.*, at the physical layer or the media access control layer. Much less standardization occurs at higher levels of the protocol stack, particularly the application layer—the layer at which the end user interacts with the technology.

In the somewhat specialized world of land mobile radio, particularly public safety radio, equipment and technology companies have relied on standards, rather than the ad hoc development of interoperable application software. Those standards have generally addressed all layers of a protocol stack, including the application layer. For example, the standard for narrowband voice interoperability channels specifies an "over-the-air" interface standard (ANSI/TIA/EIA-102.BAAA) at the physical level, as well as a vocoder standard (ANSI/TIA/EIA=102.BABA), the latter being analogous to an application layer. This combination yields the desired interoperability.

To achieve the Commission's desired level of interoperability for the 700 MHz wideband interoperability channels, M/A-COM believes that the TIA-902 (SAM) standard must do likewise. The Commission should therefore seek further development of the TIA-902 (SAM) standard to address "application layer" standardization.

C. If the Commission Finds a Need for the TIA-902 (SAM) Standard, It Should Defer the Requirement to Manufacture Radios Capable of Operating Over All Interoperability Channels

Should the Commission conclude that there is a need for 700 MHz wideband interoperability channels and a mandatory standard, the Commission should refine the standard to address the application layer before requiring the manufacture of radios capable of operating over all interoperability channels. M/A-COM believes the Commission should generally seek to harmonize its rules for narrowband and wideband operations in the 700 MHz band. But the Commission should not require manufacturing conditioned upon compliance with an incomplete standard. By adopting an air interface standard—without addressing the application layer—and mandating it in all 700 MHz equipment, the Commission would only increase the cost of radios without providing any true interoperability benefit.

III. OTHER MATTERS

A. M/A-COM Supports the TIA-PRS Proposals to Include ACP Emission Limits for 50 kHz and 100 kHz Transmitters and to Amend the ACP Emission Limits for 150 kHz

M/A-COM supports the TIA-PRS proposal to amend Section 90.543 to include tables describing ACP emission limits for 50 kHz and 100 kHz, and to amend the ACP emission limits for 150 kHz transmitters.[14] M/A-COM supported these proposed limits during the TIA-PRS standard development process and continues to support them in this proceeding.

B. M/A-COM Supports the Commission's Proposed 700 MHz Trunking Requirements for Narrowband State Licenses and Low-Power Channels

M/A-COM supports the Commission's proposed 700 MHz trunking requirements, both for narrowband state licenses and low-power channels. By clarifying that the Section 90.537

[14] NPRM, 20 FCC Rcd. at 845-48 ¶ 36.

trunking requirements extend to 700 MHz narrowband public safety channels, M/A-COM believes the Commission would further its objective of promoting efficient use of the radio spectrum.[15] M/A-COM believes there is no basis for removing the low-power channel trunking exemption in Section 90.537 and therefore supports the Commission's proposal to reinsert the exemption language into the rule.[16]

CONCLUSION

Consistent with the positions stated above, M/A-COM urges the Commission to address technical and operational matters for the 700 MHz frequencies in order to ensure timely access by public safety entities to much-needed frequencies.

Respectfully submitted,

M/A-COM, INC.

Dr. Ernest Hofmeister
Technology Fellow
Wireless Systems Business Unit
M/A-COM, INC.
221 Jefferson Ridge Parkway
Lynchburg, Virginia 24551
+1 434 455 9555 tel

Kent D. Bressie
Damon C. Ladson
HARRIS, WILTSHIRE & GRANNIS LLP
1200 18th Street, N.W., Suite 1200
Washington, D.C. 20036-2560
+1 202 730 1337 tel

Counsel for M/A-COM, Inc.

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15 *See id*. at 861 ¶ 77; 47 C.F.R. § 90.537.

16 *See* NPRM, 20 FCC Rcd. at 861 ¶ 78.